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Cooperative Digital Summit 2026: Building the Next Pillar of India's Inclusive Growth

Women Farmers: The Driving Force of Agricultural Transformation

From Qualifications to Skills: Rebuilding Agricultural Education in India

From Farm to Fortune: Unlocking India's Agri-Value Potential



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REIMAGINING AGRICULTURE THROUGH INCLUSION, INNOVATION AND INSTITUTIONS

This edition of Smart Agripost captures a defining moment in India's agri-food transformation—one where inclusion, technology, and institutional reform are converging to shape the future of rural economies. From cooperative digitization to women-led agricultural change, and from cloud infrastructure to education reform, the narratives presented here are not isolated developments; they are interconnected shifts pointing toward a more resilient and equitable agri-system.

At the heart of this transformation lies the cooperative sector. As highlighted in the Cooperative Digital Summit 2026, digital transformation is no longer a choice but an imperative for cooperatives to remain relevant, transparent, and competitive. The emphasis on shared digital infrastructure, fintech integration, and governance reforms reflects a broader vision—one where cooperatives evolve into agile, technology-enabled institutions while retaining their foundational commitment to inclusiveness.

Complementing this institutional shift is the growing recognition of women as central drivers of agricultural transformation. Despite contributing significantly across the value chain, women remain underrepresented in ownership, decision-making, and access to resources. The outcomes of GCWAS-2026 and the call for a Global Alliance on Women in Agri-Food Systems signal a decisive move from acknowledgment

to action, aiming to transform “invisible labour” into visible leadership.

Technology, too, is undergoing a paradigm shift. The emergence of sovereign and neo cloud architectures reflects India's evolving priorities around data governance, cybersecurity, and financial inclusion. For the cooperative and rural financial ecosystem, such innovations are not merely technical upgrades but foundational enablers of trust, compliance, and scalability.

Equally important is the transformation underway in agricultural education. Moving from degree-centric models to skill-based, market-aligned systems is redefining how future professionals engage with agriculture. The shift toward entrepreneurship, industry integration, and lifelong learning signals a reorientation of the sector—from job seeking to job creation.

Together, these developments underscore a central message: the future of agriculture will be shaped not by isolated interventions, but by integrated approaches that align policy, technology, gender equity, and education. As India navigates this transition, the challenge and opportunity lies in ensuring that growth remains inclusive, innovation remains accessible, and institutions remain responsive to the needs of those they serve.

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COOPERATIVE DIGITAL SUMMIT 2026: BUILDING THE NEXT PILLAR OF INDIA'S INCLUSIVE GROWTH

Dr Sagar Wadkar & Pravash Pradhan

“A comprehensive roadmap emerging from the Summit highlights digital infrastructure, governance reforms, and fintech integration to make cooperatives transparent, competitive, and future-ready”

Background

Role of cooperatives in the context of meeting sustainable development goals (SDGs) is well recognized. This recognition was evident in the various proceedings of the International Year of Cooperatives 2025. Cooperatives bear the ambidextrous character of protecting members' interests by doing business like any other business entity while ensuring equitable participation in their governance and use of services. Global views suggest that digital transformation is a necessary condition

for governments, regulators, businesses, networks, and citizens to contribute meaningfully to making societies sustainable and a better place to coexist. Digital transformation strategies call for “inclusive digital transformation,” and this is where the role of digitally transformed cooperatives is quite emphatic. This is because, while other entities are limited to growth, cooperatives intrinsically bear the responsibility of inclusiveness. It is a fact that transformation is hard to enforce,



and thus digital transformation is harder. The term digital transformation is further challenging for cooperatives, as members themselves are the leaders and users of services, with high stakes in terms of survival and limited resources. These challenges notwithstanding, cooperatives need to undergo digital transformation to remain relevant in the market.

In India, this global momentum aligns strongly with the national agenda of Digital India, financial inclusion, and the renewed policy focus on strengthening the cooperative sector as a key pillar of grassroots economic development. With over 800,000 cooperatives and millions of members, the sector holds immense potential but also faces structural challenges related to governance, transparency, scale, and market access. Digital transformation, therefore, is not merely an option but an imperative for making cooperatives future-ready, competitive, and member-centric.

Against this backdrop, P2C Communications and Gokhale Institute of Politics and Economics (GIPE) organised a two-day Cooperative Digital Summit 2026 in Pune. The Summit brought together policymakers, cooperative leaders, financial institutions, technology experts,

academia, and practitioners to collectively examine the role of digitalization in redefining cooperatives. The discussions were designed to move beyond the idea of simple computerization and instead focus on how digital tools can strengthen governance frameworks, improve financial systems, enable market linkages, and build institutional capacities.

The Cooperative Digital Summit 2026 aimed to address a few questions: whether (a) cooperatives need digital foundations to be future-ready, (b) cooperatives have the potential to create, access, and use digital markets, (c) cooperatives will be able to absorb the potential of the new technology era and spawn new business models, (d) cooperatives will be able to use fintech solutions and enhance risk-taking abilities, (e) cooperative banks will have the desired competence to compete with commercial banks and yet retain member interests, and (f) cooperatives will be able to leverage digital transformation to foster good governance, leadership, and compliance.

The deliberations aimed not only to identify current gaps but also to outline actionable pathways and a future course



for the cooperative sector in a rapidly evolving digital landscape.

Key Recommendations:

Build a Common Digital Infrastructure for Cooperatives

Instead of each cooperative developing isolated technology systems, a shared digital backbone may be created for the cooperative sector. Such an infrastructure may include integrated member database systems, ERP or Core Banking platforms for societies and cooperative banks, digital compliance and reporting modules, online grievance redressal portals, and cooperative e-marketplace platforms. Developing a common digital infrastructure will help especially small and medium cooperatives access affordable and reliable technology solutions while ensuring better interoperability, transparency, and efficiency across the cooperative ecosystem.

Complete Basic Digitization of Cooperative Records

Many cooperatives still maintain records in manual or paper-based formats. A nationwide effort may therefore be undertaken to digitize key cooperative records such as membership registers, share registers, loan records, procurement transactions, inventory records, and audit reports. Establishing clean and reliable digital records should be treated as the first step of digital transformation before adopting advanced technologies such as artificial intelligence or blockchain.

Strengthen Digital Capacity of Boards and Management

Successful digital transformation requires leadership that understands technology and its practical implications. Regular training programmes should therefore be organized for board members, CEOs, managers, and staff of cooperatives on digital governance, fintech tools,



cybersecurity awareness, and use of data for decision-making. Cooperative training institutions may also update their curriculum to include digital management and technology adoption in cooperatives.

Introduce Digital Governance and Transparency Systems

Digital tools should be used to strengthen governance, transparency, and accountability across cooperative institutions. Cooperatives may adopt systems such as digital board documentation, online disclosure of financial statements, real-time dashboards, digital audit trails, and member information portals to improve transparency and internal oversight. Cooperative laws and rules at the Central and State levels may also provide enabling provisions for conducting Board meetings, Annual General Meetings (AGMs), and Special General Meetings (SGMs) through video conferencing or other secure digital platforms. Similarly, legally recognized

e-voting systems may be introduced to enable wider member participation in decision-making and elections while maintaining transparency, auditability, and democratic functioning of cooperatives.

Strengthen Digital Compliance and Cooperative Databases

A robust digital compliance architecture may be developed across the cooperative sector. The national cooperative database may enable digital tracking of members and directors across cooperatives. Membership verification may be supported through Aadhaar-based or other legally permitted identity systems to ensure authenticity of records. The MSCS-CRCS portal may be further strengthened and gradually integrated with PAN, GSTN, banking databases, and the national cooperative database. In addition, a national digital register of disqualified members and directors may be maintained to prevent ineligible persons from participating in cooperative governance.

Establish a Sector-Wide Digital Grievance Redressal System

Members and customers of cooperatives should have access to simple, transparent, and time-bound grievance redressal mechanisms. A sector-wide digital grievance portal may therefore be developed to enable online submission of complaints, tracking of grievance status, and timely resolution. Such systems may gradually be integrated with existing regulatory frameworks where required.

Accelerate Digital Payments and FinTech Integration in Cooperative Banks

Although cooperative banks serve a large number of customers, their participation in digital payment ecosystems remains limited. Cooperative banks should therefore strengthen their integration with UPI, mobile banking systems, and other digital payment platforms. Adoption of shared fintech solutions and digital credit assessment tools can also improve lending efficiency and competitiveness with commercial banks.

Promote Digital Market Access for Cooperative Products

Technology should be used to expand market opportunities for cooperative products and services. Cooperatives may be encouraged to integrate with ONDC and other e-commerce platforms, while also developing a national cooperative marketplace that connects producers, buyers, and service providers. Digital cataloguing, product traceability, improved packaging, and branding support will further enhance the competitiveness of cooperative enterprises.

Strengthen Digital Logistics and Supply Chain Systems

Digital commerce requires strong supply chain and logistics systems. Cooperatives may adopt digital inventory management, warehouse management systems, transport planning tools, and cluster-based logistics networks. PACS and other primary cooperatives may also be developed as local aggregation and

digital service centres to support efficient procurement and distribution systems.

Ensure Cybersecurity and Data Protection

As cooperatives increasingly adopt digital systems, safeguarding member data and institutional information becomes essential. Cooperatives should adopt appropriate cybersecurity measures including role-based access controls, secure cloud storage, periodic cybersecurity audits, and regular training on cyber risk management. Protecting member data and ensuring system integrity should be treated as a core governance responsibility.

Encourage Innovation and New-Generation Digital Cooperatives

The cooperative model has the potential to expand into emerging sectors such as platform cooperatives, IT and service cooperatives, digital worker cooperatives, and data-based cooperative enterprises. To support such innovation, incubation programmes, digital innovation funds, and technology partnerships may be promoted to encourage youth-led and technology-driven cooperative enterprises.

Improve Data Systems for Policy and Sector Monitoring

Reliable and updated data on the cooperative sector remains limited in many areas. A national cooperative data architecture may therefore be developed to systematically capture information on economic contribution, employment generation, operational performance, and financial indicators of cooperatives. Such systems will support evidence-based policy making and better monitoring of sectoral development.

Promote Collaborative and Phased Digital Transformation

Digital transformation of the cooperative sector should be implemented through collaboration among the Ministry of Cooperation, State cooperative departments, cooperative federations, technology institutions, fintech companies, and training organizations. Since cooperatives operate at different



levels of capacity, a phased and inclusive approach should be adopted where smaller cooperatives begin with basic digitization while larger institutions adopt more advanced digital solutions.

Way Forward

The Summit underscored that digital transformation of cooperatives is not a standalone technology initiative but a comprehensive institutional reform process. It calls for a coordinated, multi-stakeholder approach that integrates policy direction, technological innovation, institutional capacity building, and grassroots participation.

Going forward, the Cooperative Digital Summit envisions evolving into a continuing platform rather than a one-time event a series of structured engagements that bring together policymakers, academia, industry experts, and cooperative practitioners on a sustained basis. This series will adopt a multi-dimensional approach, combining

policy dialogues, thematic roundtables, research collaborations, pilot initiatives, and knowledge-sharing platforms. The objective will be to deepen engagement across key themes, generate evidence-based insights, support policy formulation, and facilitate practical implementation of digital transformation strategies within the cooperative ecosystem. By fostering continuous dialogue and collaboration, the Summit aims to contribute meaningfully to building a resilient, transparent, and digitally empowered cooperative sector in India.



INDIA'S NEXT CLOUD LEAP: SOVEREIGN AND NEO CLOUDS FOR CO-OPERATIVES

Sourav Guha

India's cloud adoption journey is entering a new phase. For nearly a decade, organizations focused primarily on scalability, cost efficiency and faster deployment through global public cloud platforms. Today, however, a new priority is emerging: data sovereignty, regulatory control, and sector-specific cloud architecture. This shift is particularly visible in India's co-operative sector, which includes co-operative banks, credit societies, agricultural institutions and state-linked financial networks. With millions of citizens relying on co-operative institutions for financial access, the digital transformation of this sector is no longer optional. As these

organizations modernize their technology infrastructure, sovereign cloud and neo cloud architectures are increasingly being viewed as strategic enablers rather than technology upgrades.

A Sector at the Center of Financial Inclusion

India's co-operative ecosystem is vast and deeply rooted in the country's economic framework. According to government data, India has over 8.5 lakh co-operative institutions serving hundreds of millions of members across agriculture, banking, housing and consumer sectors. Many urban and rural co-operative banks act as the first point of financial access for semi-

urban and rural populations. However, digital infrastructure within many of these institutions still reflects legacy systems on-premise servers, fragmented data management, and limited cybersecurity capabilities. As digital banking, real-time payments and regulatory reporting become more data intensive, co-operative institutions are increasingly looking at cloud platforms to modernize operations.

Yet the question is no longer simply “whether to move to the cloud.” The real question has become “which cloud model best protects national data, ensures compliance and supports sector-specific needs.”

The Growing Importance of Data Sovereignty

India’s evolving data protection landscape is reshaping technology decisions across industries. The implementation of the Digital Personal Data Protection (DPDP) Act has intensified discussions around data localization, governance and regulatory oversight.

For co-operative institutions, the stakes are particularly high. These organizations manage sensitive financial data belonging to millions of members. Ensuring that this information remains within national jurisdiction and under regulatory visibility has become a critical priority.

This is where sovereign cloud frameworks are gaining traction. Sovereign cloud environments ensure that data storage, processing and management remain within a country’s legal and regulatory boundaries. For financial institutions operating under the supervision of the Reserve Bank of India (RBI) and other sectoral regulators, such architectures provide greater assurance on compliance, auditability and risk management.

Neo Cloud: A Flexible Model for Emerging Institutions

Alongside sovereign cloud, another model is gaining attention neo cloud. Unlike traditional public cloud deployments, neo cloud architectures combine localized infrastructure, industry-specific platforms and modular cloud services designed to meet specialized operational

requirements.

For co-operative institutions, neo cloud models can offer several advantages:

- Localized infrastructure with sector-specific compliance
- Flexible scalability without heavy capital investment
- Built-in cybersecurity frameworks
- Faster integration with digital banking ecosystems

As digital services such as mobile banking, UPI integration, digital lending and analytics expand within the co-operative sector, the ability to deploy targeted cloud solutions becomes increasingly valuable.

Cybersecurity and Resilience as Key Drivers

Cybersecurity concerns are another major factor pushing co-operative institutions toward modern cloud environments. The financial sector globally continues to face rising cyber threats, and smaller financial institutions often lack the resources to maintain advanced in-house security infrastructure.

Cloud-based models particularly sovereign and neo cloud frameworks can provide centralized security monitoring, advanced threat detection and regulatory-aligned security controls. These capabilities are essential as financial institutions become more digitally interconnected.

Moreover, disaster recovery and business continuity are becoming critical requirements. Cloud platforms enable geographically distributed infrastructure, ensuring operational resilience even during system disruptions.

The Role of Technology Partners

The shift toward sovereign and neo cloud adoption is also encouraging collaboration between technology providers, cloud specialists, and financial institutions. For many co-operative organizations, digital transformation requires not only infrastructure modernization but also strategic guidance on data governance, security frameworks and regulatory compliance.

Experts in the domain opine that - “India’s co-operative sector is entering a pivotal phase of digital modernization. Sovereign and neo cloud frameworks offer a balanced approach combining



regulatory assurance, localized infrastructure and scalable digital capabilities. For institutions that serve millions at the grassroots level, building secure and compliant digital foundations will be essential for the next decade of financial inclusion.”

Looking Ahead

India’s digital economy is projected to expand rapidly over the coming years, with financial services expected to be a major driver of technology adoption. As regulatory frameworks evolve and digital transactions grow, cloud strategies will increasingly be shaped by governance, resilience and sector-specific needs. For the co-operative sector, sovereign and neo cloud models may represent the next step in its digital journey enabling institutions to modernize operations while maintaining the trust and regulatory

integrity that define their role in India’s financial ecosystem.

Rather than replacing traditional banking infrastructure overnight, these cloud frameworks are likely to complement existing systems, gradually creating a more secure, scalable and digitally connected co-operative financial network.

In that sense, the rise of sovereign and neo cloud in the co-operative sector is not merely a technology trend. It reflects a broader shift in how India is thinking about data governance, financial inclusion and digital resilience in the years ahead.

(About the Author : Sourav Guha serves as AGM, Writer Corporation. He can be reached at sourav.guha@writercorporation.com)

FROM QUALIFICATIONS TO SKILLS: REBUILDING AGRICULTURAL EDUCATION IN INDIA

Dr R C Agrawal & Prof. Gerry Boyle



Drawing on exchanges with agri-food education systems in Europe, this piece reflects on what changed — and what still needs to.



Four Students Who Changed Their Minds

When Archita Goswami, Mriganka Barman, Debia Polla, and Kirtiman Borah enrolled in MSc Agriculture at Assam Agricultural University (AAU), Jorhat, none of them imagined they would become entrepreneurs. Like most of their peers, they expected to graduate and spend months preparing for government service examinations the familiar fallback plan for agricultural graduates across India. Today, they run Core Organica, an agribusiness that has converted three villages in Assam into eco-tourism sites through organic cultivation, trained over 600 farmers on behalf of the Government of Assam, and is steadily building a market for sustainable produce across the Northeast. Their annual turnover is



Dr R C Agrawal

growing. More importantly, they are creating employment and proving that agricultural careers can be built, not just found.

What changed? A project that decided the problem was not the students. It was the institutions.

The Perception Problem

For a generation, agriculture lost the aspiration race in India. Engineering, medicine, commerce, law these were careers. Agriculture was what you studied if you had not qualified for something else. The consequences were visible everywhere: outdated labs, theory-heavy curricula, limited industry exposure, and a graduate pipeline still oriented toward a shrinking pool of government jobs.

Placement outcomes were widely perceived as weak. Families updated their beliefs about agricultural degrees based on what they saw working and what they saw, too often, was graduates struggling to find relevant employment. Degrees

earn respect when they lead to good jobs. Agricultural degrees, in too many institutions, had stopped doing that. This was not a uniquely Indian problem. Discussions with agri-food education systems in Europe including Ireland, where a national strategy refresh prompted frank debate about the gap between qualifications produced and skills actually needed by industry surfaced the same structural failure: systems that optimized for credentials while underinvesting in capability. The Irish framing of shifting from 'qualifications access' to 'skills access' resonated strongly with what ICAR's NEP-2020 implementation roadmap described plainly as India's "80:20 problem" where only 20% of agricultural graduates found suitable employment, and the rest faced underemployment or worse.

Two Agricultures, One Graduate Pipeline

India did not have one agricultural economy. It had two and they were growing apart. The first was the agriculture of staples and risk management: millions of smallholders operating under tight margins, climate stress, and policy-dependent price signals. This was the agriculture that universities had long been designed to serve.

The second was the agriculture rapidly emerging around them: digitally coordinated dairy cooperatives, data-driven agri-logistics, fast-growing food processing industries, and an agritech ecosystem attracting serious private investment. This second agriculture needed graduates who could move across technology, markets, biology, and management. Instead, it received students trained for an economy that no longer fully existed.

A structural issue deepened the mismatch. Academic incentives often rewarded progression through research and postgraduate pathways more than preparation for industry roles. Yet the sector needed not only plant breeders and soil scientists, but also quality technicians, supply chain managers, rural entrepreneurs, and applied problem-

solvers. The graduate pipeline was producing the wrong profile in the wrong proportions.

The Bet: 74 Universities, One Hypothesis

In 2017, the Government of India and the Indian Council of Agricultural Research (ICAR), with World Bank support, launched the National Agricultural Higher Education Project (NAHEP) a USD 165 million investment built on a specific hypothesis: that India's agricultural graduates were being failed before they ever graduated.

NAHEP did not pick winners. It worked across 74 agricultural universities simultaneously virtually the entire system. The premise was that India did not need a few islands of excellence. It needed the whole archipelago lifted.

"The premise was that India did not need a few islands of excellence. It needed the whole archipelago lifted."

The transformation was designed to make capability visible. New facilities precision agriculture labs, food testing centres, AI labs, digital classrooms, incubation centres, and tea processing units did more than improve teaching. They sent a signal to students and families: agricultural campuses can be places where the future is built.

Curricula were redesigned toward emerging roles. Over 600 new, market-oriented courses entered the system. Internships became mandatory. Industry professionals began teaching alongside professors. Pedagogy shifted toward problem-solving, teamwork, and the transferable skills that employers actually value.

What Changed: The AAU Story

The numbers at Assam Agricultural University, Jorhat, tell a striking story. Before NAHEP, barely 5% of graduates entered private industry employment the rest either continued to higher studies or queued for government examinations. By 2023, that figure had reached 56%. Average graduate income rose from INR 4.1 lakh in 2018 to INR 5.3 lakh in 2022 a

29% increase that students and families notice. AAU's standing in the ICAR State Agricultural University ranking moved from 36th among 60 universities in 2018 to 19th by 2023, and applications to undergraduate programmes rose from 16,000 to over 19,000 in the same period, even as seat numbers expanded.

These are early indicators, and the direction is clear with evidence suggesting the pace of change is now accelerating. Students and families were beginning to update their beliefs.

Seven new pilot courses were introduced in bakery technology, biopesticide production, commercial floriculture, pig farming and pork processing, poultry husbandry, biofertiliser production, and work physiology all grounded in the specific market needs of the Northeast. These were not generic additions to a course catalogue. They were a response to what the region's agri-food economy actually needed.

Forty-two faculty members received international training at 32 institutions across the world. One of them, Dr Bikram Borkotoki, spent six months at Washington State University working on biochar co-composting research he then brought back to AAU, designing innovative composting structures now being studied for greenhouse gas emissions and carbon sequestration. Before NAHEP, he had not considered such an opportunity possible.

Job Creators, Not Job Seekers

Perhaps the most significant shift at AAU and one that mirrors what NAHEP produced across the system was in the direction of entrepreneurship. NeatEhub, AAU's incubation centre, began providing students with infrastructure, mentorship, networking, and access to markets. The results were unexpected even by the project's own designers.

Nurturing entrepreneurs had not been an explicit objective. But students sensed the possibility and reached toward it. Today, at least 14 active student entrepreneurs are working in the tea husbandry sector alone, generating combined revenues of INR 25 lakh in

2023-24 and creating employment for others in their communities.

Core Organica the venture launched by Archita, Mriganka, Debia, and Kirtiman after their training in Switzerland is perhaps the most vivid illustration of what this shift means. They did not return from Switzerland looking for jobs. They returned with a business idea, a sense of market opportunity, and the confidence that their university had helped build. They are now training the farmers their parents' generation might have taught them to look down on.

Students who enrolled expecting to seek jobs graduated creating them.

Across the System

The AAU story was replicated, in different forms, across NAHEP's 74 partner universities. System-wide, average student placement rates rose from approximately 42% at baseline to 67% by 2023-24, with women graduates reaching 71%. Over 826,000 students and faculty were directly reached by the project. More than 749 facilitative units incubation centres, language labs, digital classrooms, industry-interface platforms were established or upgraded across the system.

Agri-tech companies that had not traditionally recruited from agricultural universities began appearing at placement fairs. Food technology programmes that had trained students for domestic markets began producing graduates moving into quality assurance roles with export-oriented firms. The repositioning was real, even if uneven across institutions.

The reform also generated something harder to measure: a shift in how agricultural universities saw themselves. From exam-preparation centres for shrinking government rosters, toward talent partners for a transformed food system.

The Next Phase: Staying Connected

NAHEP proved the model works. It did not, and could not, complete the job.

Challenges remain: keeping curricula current as AI and climate adaptation reshape the sector, deepening practical learning and last-mile extension, and building the feedback loops that keep universities anchored to real market signals rather than drifting back toward academic self-reference.

This is where the exchange with European agri-food education systems has been most instructive. Ireland's Teagasc model which links research, advisory services, and education within a single institutional framework demonstrates the value of keeping teaching connected to live industry problems and practical application rather than treating these as separate functions. The principle is not replicable mechanically at India's scale, but it is highly relevant: the strongest agricultural education systems are those with the tightest feedback loops between what is taught, what is researched, and what farmers and firms actually need. For India, this means deeper co-design with industry so curricula keep pace with changing technologies and standards; stronger integration of practical instruction with agricultural extension, which remains the weakest link in the system; and closer connection between university research and on-farm application.

It also means rethinking universities as institutions professionals return to throughout their careers not just once in their lives. Short, stackable courses for working agri-professionals; credentialed upskilling in data, mechanisation, food safety, and enterprise management; and



Prof. Gerry Boyle

clearer pathways for mid-career re-entry. As climate adaptation, digital tools, and new market requirements continuously reshape what farmers and agri-businesses need to know, lifelong learning cannot remain a side programme. It must become a core function.

First Choice

Return to Assam. Four young women who graduated with MSc degrees from

a university that, five years earlier, had barely been visible in national rankings. They did not leave Assam to find opportunity elsewhere. They found it at home in organic agriculture, in community training, in the Northeast's extraordinary potential for differentiated, high-value produce.

That is the shift from fallback to first choice. Agricultural careers that students choose because they want them because the universities preparing them are worth choosing, because the industry they enter is dynamic and growing, because the skills they gain travel across a widening range of roles.

NAHEP did not finish that transformation. But it showed, convincingly, that agricultural higher education can move from producing qualifications to building skills and that this shift can change how students, employers, and society value the sector itself.

India's agricultural economy needs this generation to choose it. NAHEP began making that choice rational.

(About the Authors: Dr R C Agrawal served as the DDG (Education), ICAR while Prof. Gerry Boyle, is an Emeritus Professor of Economics, Maynooth University, Ireland)

WOMEN FARMERS: THE DRIVING FORCE OF AGRICULTURAL TRANSFORMATION

Dr. R. S. Paroda

Introduction

Agriculture remains the cornerstone of India's economy, providing food security, livelihoods, and nutrition to over a billion people. Within this critical sector, rural women represent one of the most vital yet under-recognized workforces, serving as the backbone of agricultural production and rural sustainability across the entire value chain. Their multifaceted contributions encompass field operations including sowing, transplanting, weeding, harvesting, and crop management, alongside comprehensive livestock management covering dairy, poultry, and animal husbandry.

Women also drive allied sectors such as horticulture, fisheries, sericulture, and food processing, while managing essential post-harvest activities like processing, storage, and value addition.

Beyond direct agricultural engagement, rural women shoulder dual responsibilities that sustain both farm productivity and household stability. They establish critical market linkages through local trading and produce marketing, ensure family nutrition through childcare, cooking, and dietary management, and oversee household economy through financial management and resource allocation. Despite performing nearly 80% of farm operations, managing 90% of livestock care, and contributing over 50% to family income, women own less than 20% of agricultural land and remain significantly under-invested in terms of technology access, credit facilities, training programs, and decision-making authority.

This recognition-investment gap represents a substantial missed opportunity for India's agricultural transformation. Equipping rural women with modern tools, financial inclusion, skill development, and leadership opportunities holds transformative potential to increase agricultural productivity by 20-30% while ensuring sustainable rural development. When women gain equitable access to resources and opportunities, they don't just enhance farm output—they strengthen food systems, improve nutritional outcomes, empower households, and drive economic resilience across rural India.

Global Conference on Women in Agri-Food Systems (GCWAS-2026)

*Driving Progress,
Attaining New Heights*

March 12-14, New Delhi, India

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March 12-14



Many of these contributions remain invisible in formal economic statistics because they are not categorized as “economically active employment.” Nevertheless, their impact on rural livelihoods and family welfare is immense. Women’s labour supports not only agricultural productivity but also the well-being and stability of rural households. Their role in nurturing family health, ensuring food security, and encouraging education among children significantly shapes the socio-economic development of rural communities.

Despite this crucial contribution, women’s efforts are often undervalued, underpaid, or unrecognized. Understanding and strengthening women’s participation in agriculture is therefore essential for sustainable agricultural growth and rural development.

2026 is the UN-designated International Year of the Woman Farmer (IYWF 2026), proclaimed by the UN General Assembly to recognize women’s essential yet often invisible contributions to global agrifood systems. It aims to drive policy reforms, boost investments, and foster partnerships to close these gaps, potentially increasing global GDP by \$1 trillion and reducing food insecurity for 45 million people.

The Multi-Dimensional Role of Women in Agriculture

Historically, women have played a fundamental role in the evolution of agriculture. Anthropological evidence suggests that women were among the earliest innovators of farming. While men were engaged in hunting activities, women began gathering seeds and experimenting with their cultivation. This gradual process eventually led to the domestication of crop plants and the emergence of settled agricultural communities.

Since then, women have remained central

to the development and sustainability of agriculture. They contribute not only to food production but also to the conservation of natural resources such as land, water, forests, and biodiversity. Through traditional practices like organic recycling, seed preservation, and crop diversification, women have helped maintain soil health and genetic diversity in farming systems. Women's work in agriculture can broadly be categorized into three interconnected domains.

First, they play a significant role in farm production activities such as seed selection, sowing, transplanting, irrigation, application of fertilizers and pesticides, harvesting, threshing, winnowing, and storage of agricultural produce.

Second, women carry out numerous domestic responsibilities including cooking, child-rearing, collecting water and fuel, cleaning, and managing household consumption. These activities ensure the survival and welfare of farm households. Third, women are actively involved in allied agricultural sectors such as livestock management, dairy production, fodder collection, poultry keeping, and small-scale agro-processing.

Despite such extensive participation, women often have limited access to modern agricultural technologies, improved tools, credit facilities, and extension services. As a result, their labour-intensive work yields lower economic returns compared to men. In India, women contribute between 55 and 66 percent of the total labour involved in agricultural production. In certain regions the contribution is even higher. For example, studies conducted in the Himalayan region reveal that on a one-hectare farm, a pair of bullocks works about 1,064 hours annually, a man works around 1,212 hours, whereas a woman contributes nearly 3,485 hours of labour. This clearly demonstrates the magnitude of women's involvement in farming activities. Globally, women farmers represent nearly a quarter of the world's population and produce more than half of the world's food. Women also reinvest a much larger portion of their earnings into family welfare compared to men. Studies indicate that women invest nearly ten times more of their

income into children's education, nutrition, and healthcare.

Ensuring equal access to agricultural inputs, knowledge, and resources for women could significantly enhance global food production. It is estimated that bridging the gender gap in agriculture could increase crop productivity by 20–30 percent and raise overall agricultural output in developing countries by 2–4 percent, potentially reducing global hunger by up to 17 percent.

These observations highlight that empowering woman is not only a matter of social justice but also a powerful strategy for achieving food and nutritional security.

Limited Role of Women in Decision-Making

Although women form the backbone of the agricultural workforce, they continue to remain among the most vulnerable and marginalized groups in rural societies. In most developing countries, including India, women bear the double burden of agricultural labour and domestic responsibilities while having minimal influence in decision-making processes. In Indian agriculture, women undertake some of the most physically demanding farm operations. They perform nearly half of transplanting and threshing work, around one-third of harvesting activities, and a majority of post-harvest operations. Women are also primarily responsible for livestock care, fodder management, and household food preparation.

Yet their access to key resources such as land, credit, training, and agricultural inputs remains severely restricted. Land ownership in rural India is predominantly male-dominated, which automatically excludes many women from formal financial systems and government agricultural support schemes.

Statistics show that only around 11 percent of women have ownership of agricultural land, and even among them most are small or marginal farmers. Without land titles, women often face difficulty accessing institutional credit, insurance schemes, and agricultural subsidies.

Furthermore, marketing of agricultural produce is typically controlled by male

members of the household. As a result, men often control the financial returns from women's labour. Industrialization and migration have also reshaped rural demographics. As increasing numbers of men migrate to urban areas in search of employment, women are left to manage farms and households simultaneously. Despite taking on greater responsibilities, their work remains largely unpaid and socially undervalued.

Another major challenge is that agricultural research and extension systems have historically been gender-blind. Technologies are often designed without considering women's physical needs, workload, or cultural constraints. Such inequalities not only limit women's potential but also hinder overall agricultural productivity and economic growth.

Women's Role in Agricultural Innovation Systems

Innovation plays a crucial role in transforming agriculture, but its success depends on whether it addresses the needs of all stakeholders, including women farmers. Historically, women have been largely excluded from innovation processes, including research planning, technology development, and policy discussions.

To make agricultural innovations more inclusive and effective, women must be actively involved in knowledge generation and decision-making across the agricultural value chain.

Women already play an important role in post-harvest management, food processing, storage, and marketing. These areas connect agricultural production directly with household nutrition and income generation. Therefore, innovations in these sectors can significantly enhance women's livelihoods.

For example, in the dairy sector, innovations such as milk chilling plants, refrigerated transport systems, and small-scale processing units for products like yogurt, ghee, and cheese can greatly improve value addition and income opportunities for rural women. Similarly, women's participation in

farmer producer organizations, rural enterprises, and agricultural cooperatives can strengthen rural economies while promoting gender equity.

To achieve this, agricultural innovation systems must adopt a holistic approach that recognizes women's roles in family welfare, child nutrition, food security, and rural livelihoods. Gender-sensitive policies and participatory research approaches are essential to ensure that new technologies genuinely benefit women farmers.

Empowering Women in Agriculture

In recent years, there has been growing recognition worldwide that empowering women is essential for achieving sustainable agricultural development and inclusive economic growth. Several international organizations, including agricultural research networks and development agencies, are working together to promote gender equality in agriculture.

India has been a pioneer in acknowledging the role of women in agriculture. In 1996, the country established the National Research Centre for Women in Agriculture in Bhubaneswar, which later evolved into the ICAR-Central Institute for Women in Agriculture (CIWA). This institution focuses on developing women-friendly agricultural technologies, improving gender-sensitive farming systems, and reducing drudgery in farm operations. The institute also conducts skill development programs, vocational training, and capacity-building initiatives aimed at empowering rural women through technology adoption and entrepreneurship.

Empowerment initiatives have gradually shifted women's roles from passive beneficiaries to active partners in development. Policy reforms have also been proposed to improve women's access to land, water, credit, and agricultural inputs.

One significant policy suggestion was the Women Farmers' Entitlement Bill (2011) proposed by Dr. M. S. Swaminathan, which aimed to recognize women as farmers and ensure their rights to agricultural resources and institutional support.

The First Global Conference on Women in Agriculture

Recognizing the importance of gender equality in agriculture, India hosted the First Global Conference on Women in Agriculture (GCWA) in New Delhi in March 2012. The conference brought together women farmers, scientists, policymakers, and development experts from over fifty countries to discuss strategies for reducing gender disparities in agriculture. During the conference, leaders emphasized that empowering women with knowledge, skills, and access to technology is essential for achieving food and nutritional security. It was also highlighted that much of the available agricultural technology fails to reach rural women due to social, institutional, and cultural barriers.

One of the key recommendations emerging from the conference was the establishment of Mahila Kisan Mandals (Women Farmers' Groups) at the village level. These groups could serve as platforms for training, knowledge sharing, and collective action in agriculture and marketing.

Another important proposal was the development of a global knowledge-sharing platform for gender issues in agriculture. Such a platform would facilitate collaboration among research institutions, governments, development agencies, and grassroots organizations to address gender gaps in farming systems.

Global Conference on Women in Agri-Food Systems (GCWAS-2026)

To align with the UN's International Year of the Woman Farmer (IYWF 2026) proclaimed to recognize women's critical role in producing nearly half the world's food, bridge gaps in land and credit access, and unlock \$1 trillion in global GDP gains through FAO-led reforms—the Global Conference on Women in Agri-Food Systems (GCWAS-2026) concluded in New Delhi from March 12-14 with the adoption of the Delhi Declaration. This landmark document calls for a Global Alliance on Women in Agri-Food Systems (GAWAS) to champion gender-responsive policies and

innovations.

Inaugurated by President Droupadi Murmu alongside Union Agriculture Minister Shivraj Singh Chouhan, the GCWAS-2026 convened policymakers, scientists, and leaders from 18 countries. The conference culminated in ICAR's announcing the creation of a 'National Gender Platform' linking over 900 institutions to strengthen women-centric research and extension services. Emphasis was placed on translating dialogue into institutional support for women, who form 60-70% of agricultural labor, alongside recommendations for leadership development, credit and market access, gender-disaggregated data, and climate-resilient practices under the One Health framework, thereby reinforcing India's leadership in sustainable agri-food systems.

Women and Household Nutritional Security

The relationship between agriculture, nutrition, and women's empowerment is widely recognized. Women play a central role in determining household food consumption patterns, nutritional choices, and child health outcomes.

Malnutrition remains a serious challenge in many developing countries, particularly among women and children in rural areas. Empowering women with income, education, and decision-making power can significantly improve nutritional outcomes. Studies have shown that when women control household income, they are more likely to invest in better food, healthcare, and education for their children. Therefore, policies aimed at improving household nutritional security must prioritize women's empowerment. Agricultural research and development systems must also focus on promoting nutrition-sensitive agriculture, encouraging the cultivation of Nutrient-rich crops, and supporting women-led microenterprises in food processing and value addition. Improving women's access to market information, digital technologies, and agricultural infrastructure can further enhance their economic independence and contribution to rural development.



Ensuring Visibility of Women in Agriculture

Despite overwhelming evidence of women's contribution to agriculture, many policymakers and development professionals still underestimate their role. This lack of recognition has resulted in policies and programs that fail to address the specific needs of women farmers.

Increasing women's visibility in agricultural value chains is therefore essential. This includes recognizing their contributions in crop production, livestock management, forestry, fisheries, and agro-processing.

Women should also be encouraged to take leadership roles in agricultural research institutions, farmer organizations, cooperatives, and

policymaking bodies. Reliable gender-disaggregated data must be generated to accurately capture women's contributions and inform evidence-based policymaking. Most importantly, women themselves must become aware of the economic and social value of their work so that they can actively demand recognition, rights, and opportunities.

Way Forward

Women play a vital role in almost every aspect of agriculture and rural livelihoods. However, achieving inclusive agricultural growth requires deliberate efforts to empower women and remove structural barriers that limit their participation.

First, there is a need for collective advocacy to raise awareness about women's contributions to agriculture and ensure their visibility in policy discussions. **Second**, education and skill development



programs must be expanded to enable women to adopt modern farming techniques and participate in diversified agricultural enterprises.

Third, collective action through women's self-help groups, cooperatives, and producer organizations should be strengthened to enhance women's bargaining power in markets.

Fourth, efforts must be made to reduce drudgery in farm operations by promoting women-friendly tools and technologies.

Fifth, gender-sensitive agricultural research and extension systems should be developed to address the specific needs of women farmers.

Sixth, policies and legal frameworks must ensure women's rights to land ownership, credit, markets, and institutional support.

Finally, social and cultural institutions must evolve to create an environment in which women can fully realize their potential as farmers, entrepreneurs, and leaders.

Investing in women's education, skills, and leadership will not only improve agricultural productivity but also contribute to better nutrition, health, and education outcomes for future generations.

Empowering women in agriculture is therefore not merely a development priority it is a strategic necessity for achieving sustainable development and ensuring food and nutritional security for the world.

(About the Author: Dr. R. S. Paroda is the Chairman, Trust for Advancement of Agricultural Sciences (TAAS), Former Secretary, DARE & Director General, ICAR)



FROM INVISIBLE LABOR TO VISIBLE LEADERSHIP: LESSONS FROM GCWAS2026

Dr Anuradha Agrawal

“New Delhi played host to a watershed moment for women in agriculture this March. The Global Conference on Women in Agri-Food Systems (GCWAS2026) wasn't just another policy meet—it was a powerful call to action, timed perfectly with the UN's International Year of the Woman Farmer (2026).”

A Global Conference on Women in Agri-Food Systems (GCWAS-2026) was held in New Delhi from March 12-14, 2026, which was organized by the Trust for Advancement of Agricultural Sciences (TAAS), Indian Council of Agricultural Research (ICAR), Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA) and Consultative Group on

International Agricultural Research (CGIAR) and supported by a consortium of 36 leading agricultural bodies, private sector and NGOs. The conference convened over 850 participants from India and 18 countries spanning scientists, policymakers, industry leaders, entrepreneurs, development practitioners, women farmers, start-ups, and students creating a vibrant global platform for dialogue and collaboration.

With representation from 22+ Indian states and women comprising nearly 60% of attendees, the event reflected both diversity and strong female participation. Under the theme “Driving Progress, Attaining New Heights” the conference produced the ‘Delhi Declaration’, a formal action plan calling for a new Global Alliance, gender-responsive policies, and a robust data ecosystem to address systemic inequalities in agri-food systems .

Power-packed Inaugural Session

The star power in GCWAS-2026 was undeniable. President of India, Smt Droupadi Murmu inaugurated the event, with Agriculture Minister Shivraj Singh Chouhan, Union Minister of Agriculture & Farmers’ Welfare, as Guest of Honour. But what truly electrified the room was the presence of grassroots women farmers sharing the stage with global experts like Dr. Agnes Kalibata and World Food Prize laureate Dr. Shakuntala Thilsted. Welcoming the United Nations’ declaration of 2026 as the International Year of the Woman Farmer, President Murmu said the initiative would help address gender inequalities and promote women’s leadership in agriculture. The President stated that several women farmers who have made remarkable contributions to organic farming, seed conservation and community leadership have been honoured with the Padma Shri, including Kamala Devi Rongmei, Maharashtra’s ‘Seed Mother’ Rahibai Soma Popere, Bihar’s ‘Kisan Chachi’ Rajkumari Devi, and Odisha’s Kamala Pujari.

Minister Chouhan described women as ‘Narayani’ and praised their contributions to food systems, emphasizing the need for strengthening their role in farming. He highlighted key initiatives like the Deendayal Antyodaya Yojana (National Rural Livelihood Mission), which has mobilised over 10 crore women through more than 90 lakh Self-Help Groups, with nearly three crore women emerging as ‘Lakhpatti Didis’ earning over ₹1 lakh annually, and a target to empower six crore women economically in the coming years. He also noted the rising role of women in agricultural research

and education, citing the work of the ICAR–Central Institute for Women in Agriculture, Bhubaneswar, since 1996, and the significant increase in women’s representation in the Agricultural Research Service from 7.9% in 2006–07 to nearly 41% in 2023–24, reflecting their growing contribution to agricultural science and innovation.

Dr R.S. Paroda, Chief Patron of GCWAS-2026, & Chairman, TAAS, said that the conference marks the beginning of a historic movement to recognise and strengthen the transformative role of women across the agricultural value chain from production and post-production to value addition and improved market linkages. In her welcome address, Dr Renu Swarup, GCWAS-2026 Chair and Former Secretary, Department of Biotechnology, Government of India, highlighted that the conference aims to translate dialogue into action by developing strategies and a roadmap to institutionalise gender-responsive initiatives with stronger policy support.

Conference Format and Thematic Sessions

The conference featured one plenary and nine thematic technical sessions, along with 371 poster presentations and 65 rapid oral presentations. It was structured around nine thematic sessions designed to bridge the gap between high-level policy and grassroots reality. These included ‘Interface with Global Women Trailblazers’, ‘Driving Progress, Attaining New Heights’, ‘Mainstreaming Gender Equality and Social Inclusion,’ ‘Emerging and Disruptive Technologies for Gender-Transformative Change’ ‘Building Women Leadership in the Agri-Food Sector’, ‘Empowering Women through Economic Inclusion’, ‘Gender Dynamics in Policy and Market Access’. Two special sessions were the ‘Women Farmers Forum – Breaking the Stereotypes’ and ‘Youth Forum: Nurturing the Next Generation of Agri-Food Leaders’.

Deliberations were held on strategies to place women in decision-making roles in science and policy, financial models, market linkages, and simplifying regulatory



processes to help women transition from “custodians to entrepreneurs,” particularly in seed value chains, climate-smart innovations, women-friendly equipment to reduce drudgery and localized digital advisories. But the conference wasn’t about patting backs. Sessions tackled uncomfortable truths - why women still own less land, access less credit, and remain invisible in agricultural statistics despite doing most of the work. It was emphasized that disruptive technologies need to reach rural women, not just urban start-ups. The conference called for simplified regulatory processes and growth capital, not just microloans. The Youth Forum reminded everyone that the next generation of women farmers needs mentorship and networks now, not later. An engaging exhibition highlighted not only the academic and scientific advancements in women-focused technologies, but also brought together a diverse range of women-led enterprises to showcase their products, innovation, and talent.

International Participation

The conference was not merely a national event but a global knowledge exchange. It featured a stellar line-up of international thought leaders and representatives from 18 countries. Some notable international experts included Dr Bram Govaerts (Director General, CIMMYT), Dr. Agnes Kalibata (Founder, Connect4Impact; former AGRA President), Dr. Shakuntala H. Thilsted (World Food Prize Laureate, WorldFish), Dr. Soumya Swaminathan (Chairperson, MSSRF) and Dr. Nitya Rao (Professor of Gender and Development, University of East Anglia).

Major Outcomes and Institutional Commitments

Every conference produces a statement. GCWAS2026 produced a roadmap. The final valedictory session, chaired by Dr M.L. Jat, Secretary, Department of Agricultural Research and Education & Director General of ICAR, and Dr R.S. Paroda, emphasized that the conference was the

“beginning of renewed action” and core recommendations focused on moving from “invisible labor to visible leadership”.

The most significant output of the conference was the adoption of the ‘Delhi Declaration’. Presented by Dr. Renu Swarup, the declaration is a roadmap for moving beyond dialogue to decisive action. Key pillars of the declaration include:

- Establishing a Global Alliance: A call to create a permanent “Global Alliance on Women in Agri-Food Systems (GAWAS)” to sustain momentum.
- Policy & Institutional Reforms: Urging governments to ensure women’s access to land, finance, technology, and digital innovation.
- Data Ecosystems: The systematic collection of gender-disaggregated data to support evidence-based policymaking.
- Accountability: Establishment of periodic gender audits and transparent

progress reporting.

- National Gender Platform (India): Dr. M. L. Jat, announced that India is developing a national gender platform connecting over 900 institutions (including ICAR institutes and agricultural universities) to strengthen research, extension, and capacity building focused on women.

As one participant put it during the Women Farmers Forum: “We don’t need sympathy. We need systems.” GCWAS2026 closed with a felicitation ceremony honoring successful women farmers. But the real work, speakers emphasized, begins now. The Delhi Declaration is a promise. The Global Alliance is a mechanism. The rest is up to governments, institutions, and all of us.



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THE MISSING LINK IN INDIA'S SEAWEED BOOM: A NATIONAL DNA DATABASE

Vaibhav A. Mantri^a & Digvijay Singh Yadav^b

Seaweeds: India's blue economy drivers

The Indian seaweed industry has evolved from a coastal activity into a multi-million-dollar sector, requiring scientific advancements that match market growth. A recent study by CSIR-Central Salt and Marine Chemicals Research Institute (CSMCRRI), published in the *Journal of Threatened Taxa*, identifies a critical gap, the absence of a comprehensive national DNA database, which could be pivotal for Indian seaweed farmers. For those along India's 11,099 km coastline, seaweed represents both biology and livelihood. Yet, researchers have decoded the genetic information for only 11% of India's seaweed diversity. The following points explain why this limited data is crucial for the future of Indian aquaculture.

To farmers, different red seaweed species may appear identical. This phenomenon, known as phenotypic plasticity, allows a single species to alter its appearance based on environmental conditions. If a farmer cultivates a low-quality strain, mistaking it for a high-value one, the economic impact is immediate. For example, *Gracilaria dura* is valued for its gel strength, but if it is misidentified and mixed with other *Gracilaria* species, the resulting agar may not meet industrial standards, causing significant financial



Prof. Vaibhav A. Mantri

losses. DNA barcoding uses a short genetic sequence to accurately identify species, ensuring farmers plant the correct varieties. Why India Needs a Genetic "Library" The global seaweed market is valued at approximately USD 14 billion, but India contributes only 0.01%

to global production. To address this gap, the Indian government has invested more than 600 crores in seaweed value chains through the Pradhan Mantri Matsya Sampada Yojana (PMMSY). However, without a comprehensive national DNA database, several risks persist, such as:

1. Proof of product identity and traceability for international buyers, largely of aquaculture crops.
2. Biosecurity concerns: detecting invasive or harmful blooms forming seaweed species is essential.
3. Seedling quality checks for high-value, certified seeds enable researchers and farmers to verify and select optimal strains for large-scale cultivation.

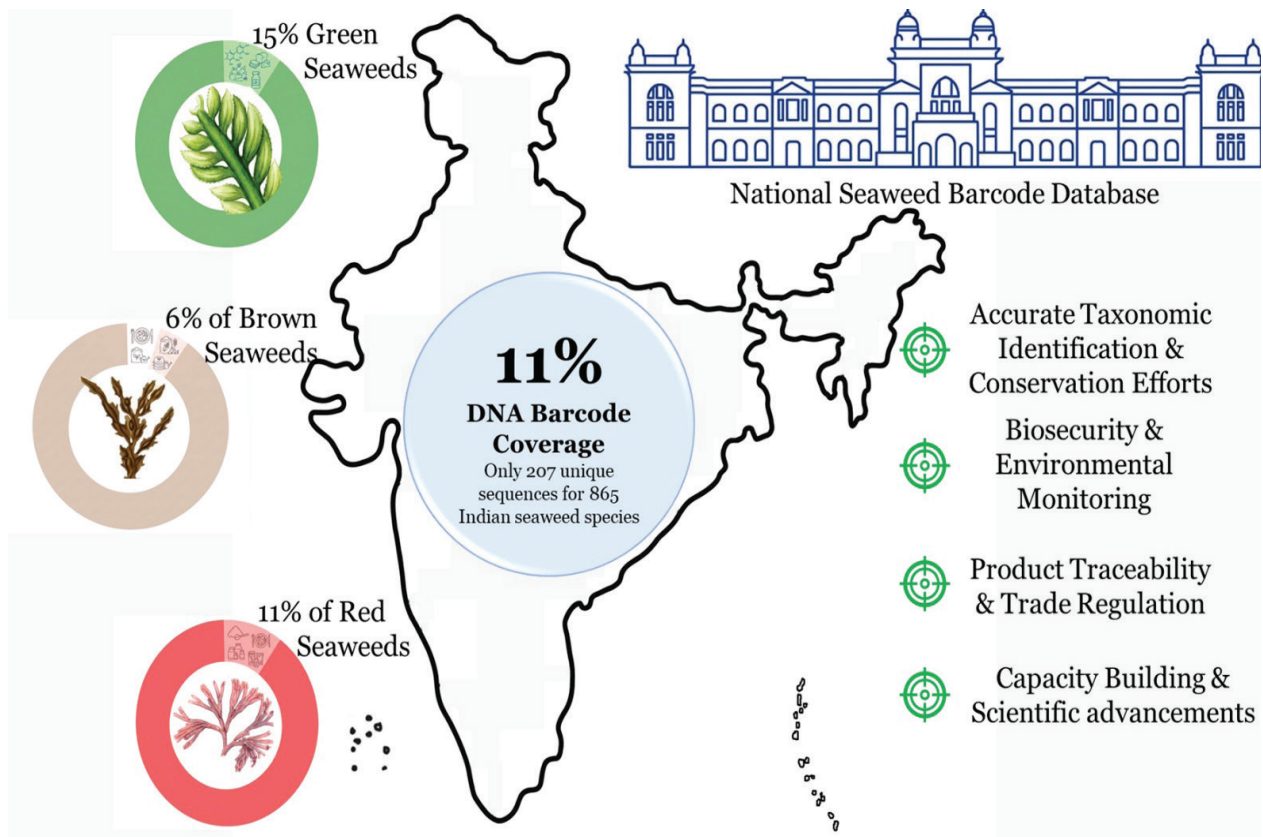
Call for Action

The study reviewed thousands of records but identified only 207 unique DNA sequences for 865 Indian seaweed species in global databases such as GenBank. Although India reports 865 species, only a few, primarily economically significant ones like *Gracilaria*, *Kappaphycus*, and *Ulva*, have been studied at the molecular

level. The remaining 90% of unexplored seaweeds may offer significant medicinal potential. Dr. Vaibhav A. Mantri and his team emphasize that a national collaborative research program is essential for biosecurity and economic growth. A nationwide initiative to map the genetic landscape of Indian seaweeds and collaboration between academic and research institutions would help researchers, policymakers, and industry stakeholders to better understand and manage India's marine biodiversity. The Indian coastline might harbor hundreds of undiscovered seaweed species, and to reveal their secrets, we must first decode their DNA.



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FROM FARM TO FORTUNE: UNLOCKING INDIA'S AGRI-VALUE POTENTIAL

Ramya C. S.¹, Parvathy Nayana N.¹, Pavithra S.² and Arun Kumar Thirumani Venkatesh^{3}*

India's agriculture is undergoing a major transformation from traditional farming to a vibrant ecosystem of innovation, processing, and entrepreneurship. Farms are no longer just about growing crops; they're becoming hubs of value creation. With support from government schemes like the Pradhan Mantri Kisan Sampada Yojana and the Production Linked Incentive Scheme for Food Processing, the sector is seeing better post-harvest management, reduced food waste, and rising exports. Processed food exports jumped from 13.7% in 2014-15 to 23.4% in 2023-24. Agri-tech startups are using AI, IoT, and satellite tech to boost productivity, while companies like Amul and Akshayakalpa are helping farmers earn more through sustainable models. This shift is turning

Indian agriculture into a global agri-value hub one that's tech-powered, resilient, and beneficial for both farmers and consumers.

India's agricultural might: the raw abundance

India's agricultural strength is undeniable. The country ranks first globally in milk, pulses, and spice production, and second in rice, wheat, fruits, and vegetables. In 2023-24 alone, India produced over 137 million tonnes of rice and 113 million tonnes of wheat demonstrating its sheer scale in agri-output. However, this raw abundance contrasts sharply with underwhelming levels of processing and value addition. Less than 10% of total agricultural produce is processed, with just 2% of fruits and vegetables entering

value chains far below global benchmarks like the U.S. (65%) and China (23%). Even in case of dairy sector, wherein India leads in production, only about 35% of milk is processed. This gap leads to immense post-harvest losses, especially in perishables and the result is not just lost food, but missed economic opportunities for farmers and the country. A recent study commissioned by the Ministry of Food Processing Industries estimated the post harvest loss in India to the tune of Rs. 1.53 lakh crores per year. The quantum of post-harvest loss was highest in case of fruits ranging from 6.02% to 15.05%, followed by 4.87% to 11.61% for vegetables, 2.87% to 7.5 % for oil seeds, 5.65% to 6.74% for pulses and 3.89 % to 5.92% for cereals.

Unlocking India's agri-value potential requires robust investments in food processing infrastructure, logistics, and cold chains. By transforming its raw produce into high-value products, India can boost farmer incomes, reduce waste, and enhance its global agri-export footprint.

What is value addition and why does it matter?

Value addition in agriculture means transforming raw farm produce into more valuable, market-ready products. It boosts farmer incomes, creates jobs, and strengthens the agri-value chain. For example, fresh tomatoes sold during peak season fetch low prices but when turned into ketchup or sauces, they gain shelf life and market appeal. Milk becomes more profitable as cheese or yogurt, while wheat can be processed into cereals or ready-to-cook mixes.

For a country like India one of the world's top producers of milk, grains, fruits, and vegetables value addition is key. It not only reduces post-harvest waste but also opens up new markets and opportunities. With better food processing infrastructure, cold storage, and agri-tech innovation, India can shift from being a raw commodity supplier to a global hub for agri-based products. Value addition is the path to higher farmer profits and a more resilient, consumer-focused farm economy.

Opportunities blooming in the agri-processing landscape

India's agriculture sector is rapidly evolving from selling raw produce to creating high-value, processed products. This shift is powered by innovation, supportive government policies, and growing global demand. Startups and Farmer Producer Organizations (FPOs) are leading the way, helping small farmers reach bigger markets. They're turning crops into branded goods like millet snacks, organic juices, and regional superfoods bringing India's rich farm heritage to modern consumers. FPOs, backed by institutions like NABARD, allow farmers to pool resources and invest in processing units, boosting their incomes. Government schemes are also driving this transformation. The PM Formalisation of Micro Food Processing Enterprises (PM-FME) scheme supports micro units with funding, training, and branding help, while the Agriculture Infrastructure Fund finances cold chains and storage. The Production Linked Incentive (PLI) scheme further encourages large-scale investments in food processing. India's processed food exports such as ready meals, frozen vegetables, and spices are gaining traction in Europe, Southeast Asia, and the Middle East. Meanwhile, organic and wellness foods are booming as health-conscious consumers seek quality and traceability. These developments are not just meeting niche demand but also fetching premium prices turning India's agriculture into a global agri-business powerhouse.

Success stories sprouting across India

Across India, value addition in agriculture is rapidly becoming a powerful reality. From remote villages to bustling startup hubs, agri-entrepreneurs are turning raw farm produce into successful, high-value businesses. These inspiring stories highlight India's untapped agri-value potential and serve as models for others to follow.

In Karnataka, DesiVDesi Foods, led by Jayashree Satish, has created a thriving brand of vacuum-fried snacks made from jackfruit, okra, and banana sourced directly from farmers. By combining



traditional ingredients with modern technology, the company now exports to over 15 countries. In Maharashtra, Tasty Dairy Specialities Ltd. began as a small milk collection center but has evolved into a major processor of paneer, flavored milk, and ice cream. With support from the PMFME scheme and NABARD, it has expanded its rural network and generated significant employment. In Jharkhand, tribal women under the Jharcraft initiative transform lac, tamarind, and mahua into value-added products like pickles, powders, and wellness oils. Meanwhile, Maharashtra's Sahyadri Farms, with over 18,000 farmers, leads in collective farming and processing of fruits and vegetables into pulp and puree for both domestic and international markets.

These success stories demonstrate how value addition can transform small-scale farming into thriving enterprises boosting rural incomes and firmly establishing India on the global agri-value map. The role of value addition in fostering local employment opportunities and women empowerment cannot be undermined given its potential to uplift the rural economy.

Challenges in the field: what's holding us back?

India's agricultural sector holds immense potential, but several challenges continue to limit the growth of value-added agri-businesses. This includes the field level limitations such as lack of proper grading, transport of the produce to lengthy supply chains with too many intermediaries that lead to loss in produce quality. The most pressing issue at the macro level is poor infrastructure—especially the lack of cold chains, modern packaging, and efficient rural logistics. Inconsistent supply chains and fluctuating raw material quality also disrupt processing, as smallholder farmers often lack standardized practices. Access to technology and affordable credit remains limited, making it difficult for small enterprises to modernize. Moreover, complex regulations, high compliance costs, and weak market linkages prevent micro and small agri-processors from scaling effectively.

Addressing these challenges through targeted infrastructure investment, easier access to finance and technology, and



streamlined policies is essential to unlock India's full agri-value potential and boost farmer incomes.

Tech to the rescue: innovations in agri-processing

Technology is transforming India's agri-processing sector, turning long-standing challenges into new opportunities. Tools like AI, IoT, blockchain, and automation are making food processing smarter, safer, and more efficient.

- AI helps predict crop yields, assess quality, and reduce waste, while smart machines can sort produce by size, ripeness, and freshness.
- IoT sensors track temperature and humidity across the supply chain crucial for preserving perishable goods.
- Blockchain adds transparency by tracing a product's journey from farm to fork vital for organic and export products.

Automation and robotics are speeding up tasks like sorting, packaging, and even

cooking, boosting hygiene and efficiency. These innovations reduce errors, cut spoilage, and raise product standards. As India adopts these technologies, it's building a stronger, more reliable agri-processing ecosystem one that benefits farmers, meets global quality demands, and cements the country's place in international agri-value chains.

Empowering the farmer: the road ahead





Unlocking India's agri-value potential begins with empowering its farmers. While technology and market opportunities are growing, real transformation requires action on four key fronts:

- 1) Policy reforms must simplify licensing, reduce excessive bureaucracy, improve access to credit and subsidies. A reformed APMC system can ensure fairer market access and better prices.
 - 2) Public-private partnerships (PPPs) can boost rural infrastructure like cold chains, food parks, and logistics through shared investment and innovation.
 - 3) Skill development is vital to prepare youth for modern agri-processing jobs. Training in food safety, packaging, and machinery can fill the rural skills gap.
 - 4) Digital tools and mobile services can help farmers access markets, advisory support, and financial services enhancing transparency and incomes.
- By combining these efforts, India can create an inclusive agri-value ecosystem

where farmers are not just cultivators, but confident agri-entrepreneurs shaping the country's food future.

Conclusion—seeding the future of Indian agriculture

India stands at a pivotal moment in its agricultural journey poised to shift from being a raw produce powerhouse to a global leader in agri-value creation. By embracing processing, technology, innovation, and inclusive policies, the country can transform its vast agricultural output into high-value products. Empowered farmers, robust infrastructure, and a vibrant ecosystem of startups and FPOs can drive rural prosperity, reduce waste, and enhance exports. With the right investments and collaboration, India's farms can become engines of economic growth, nourishing not just the nation, but the world. The future of Indian agriculture is not just productive it's value-driven.

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CSIR UNVEILS BIO-BITUMEN TECHNOLOGY TO TURN FARM WASTE INTO SUSTAINABLE ROADS

New Delhi: The Council of Scientific and Industrial Research (CSIR) held a technology transfer event to promote large-scale adoption of its “Bio-Bitumen from Lignocellulosic Biomass” innovation, aimed at converting farm residue into sustainable road material. Union Minister Shivraj Singh Chouhan called the development a “historic and transformative step” linking agriculture with infrastructure, adding it supports India’s climate goals, Net Zero targets, and initiatives like Atmanirbhar Bharat while creating extra income opportunities for farmers and reducing stubble burning. Minister of State for Science and Technology Jitendra Singh said the technology reflects the “Waste to Wealth” approach and highlighted its durability, compatibility with conventional bitumen, and lower carbon footprint, making it suitable for highway projects. CSIR Director General N. Kalaiselvi described it as a shift from petroleum-based to bio-based materials.

Developed by CSIR-Central Road Research Institute and CSIR-Indian Institute of Petroleum, the technology uses agricultural biomass to produce eco-friendly bitumen,

offering a renewable alternative while addressing pollution from crop residue and reducing dependence on imports.

CENTRE APPROVES ₹200 CRORE BANANA CLUSTER IN JALGAON, PUSHES FARMER INCOME BOOST

Jalgaon: On the occasion of Gudi Padwa, Union Agriculture Minister Shivraj Singh Chouhan interacted with banana farmers in Maharashtra’s Jalgaon and reaffirmed the Centre’s focus on boosting farmer incomes and strengthening agri-infrastructure. He announced approval of a ₹200 crore Banana Cluster project in Jalgaon, which will include facilities such as cold storage, ripening units, processing, export infrastructure, and modern farming support under schemes like Mission for Integrated Development of Horticulture and Agriculture Infrastructure Fund. Chouhan highlighted the price gap between farmgate and retail markets and said efforts are underway to ensure fair returns to farmers. He added that alternative compensation models under PM-AASHA are being explored for crops like banana when prices fall. The minister also raised concerns over excessive chemical use harming soil health and urged farmers to adopt natural farming practices. He assured that farmer feedback will guide future policies and steps will be taken to strengthen the global identity of Jalgaon’s bananas.



TO BOOST AGRICULTURAL PRODUCTIVITY AND CREDIT ACCESS

New Delhi: The government has identified 100 districts under the Prime Minister Dhan-Dhaanya Krishi Yojana (DDKY) based on three key indicators low crop productivity, low cropping intensity, and limited agricultural credit disbursement.

The DDKY scheme is aimed at improving agricultural productivity, promoting crop diversification, and encouraging sustainable farming practices. It also focuses on strengthening post-harvest storage facilities at the panchayat and block levels, enhancing irrigation infrastructure, and ensuring the availability of both long-term and short-term agricultural credit.

District Action Plans (DAPs) for the selected districts are being prepared and implemented by the respective District Dhan-Dhaanya Krishi Yojana Samitis. These plans are developed through the convergence of 36 central schemes across 11 departments, along with state government initiatives and private sector participation. The DAPs are designed to identify local challenges and address them through coordinated implementation of relevant schemes,

including the Mission for Integrated Development of Horticulture (MIDH) and Rashtriya Krishi Vikas Yojana (RKVY).

Key interventions under the plans include the adoption of climate-resilient agricultural technologies and the development of climate-smart infrastructure such as protected cultivation, micro-irrigation systems, and improved post-harvest facilities. The District DDKY Samitis, led by the respective District Collectors, are responsible for consultations and inter-departmental coordination during the formulation of these plans. For effective monitoring, State-level and National-level committees have been established. Additionally, Central Nodal Officers (CNOs) have been assigned to each district to conduct field visits and oversee the implementation and performance of the scheme.

The information was shared by Minister of State for Agriculture and Farmers Welfare, Shri Ramnath Thakur, in a written reply in the Lok Sabha.

INDIA LEADS GLOBAL COCONUT PRODUCTION; NEW PROMOTION SCHEME ANNOUNCED IN BUDGET 2026-27

New Delhi: India continues to dominate global coconut production, contributing 30.37% to the world's total output, according to the government. Coconut cultivation spans nearly 12.39 million hectares globally, with India accounting for about 2.17 million hectares. The country produces approximately 21,373.62 million nuts annually, with an average productivity of 9,871 nuts per hectare.

The coconut sector plays a crucial role in rural livelihoods, supporting around 30 million people, including nearly 10 million farmers across the country.

To further strengthen the sector, the Government of India has announced a Coconut Promotion Scheme in the Union Budget 2026–27. The scheme aims to boost production and improve productivity through targeted interventions such as replacing old and unproductive trees with high-yielding varieties. It is expected to enhance the competitiveness of coconut cultivation in major growing states.

The initiative is part of a broader ₹350 crore allocation for high-value agriculture, which also covers crops like cashew and cocoa. However, details regarding state-wise fund allocation and utilization are yet to be finalized, as the scheme is still under formulation.

The information was provided by Minister of State for Agriculture and Farmers Welfare, Shri Bhagirath Choudhary, in a written reply in the Lok Sabha.

OVER 6,900 FERTILIZER LICENSES CANCELLED AS GOVT CRACKS DOWN ON

New Delhi: The government has intensified action against fertilizer hoarding and black marketing, cancelling or suspending over 6,800 licenses and conducting more than 4.66 lakh raids since April 2025, according to the Ministry of Chemicals and Fertilizers.

In a written reply in the Lok Sabha, Minister of State Smt. Anupriya S. Patel said fertilizers are regulated under the Essential Commodities Act and Fertilizer Control Order, enabling strict action against violators. Authorities have also issued over 16,000 show-cause notices and registered 821 FIRs to curb illegal practices.

The government stated that fertilizer availability, including urea, DAP, MOP and NPKS, remains adequate during the ongoing Rabi 2025-26 season.

To ensure affordability, urea continues to be sold at a controlled price of ₹242 per 45-kg bag under the subsidy scheme, with the government bearing the cost difference. The Nutrient-Based Subsidy (NBS) scheme for phosphatic and potassic fertilizers is also being implemented, with subsidy rates adjusted to global price trends.

The Centre said these measures aim to ensure timely availability of fertilizers and protect farmers from unfair market practices.



INDIA SIGNS GREEN AMMONIA DEALS TO CUT FERTILIZER EMISSIONS, BOOST ENERGY SECURITY

New Delhi: In a major push towards clean energy and self-reliance, the government has facilitated the signing of Green Ammonia Purchase and Supply Agreements between fertilizer companies and producers under the National Green Hydrogen Mission. A total of 11 projects were formalised, marking a key step in integrating green ammonia into India's fertilizer sector. Union Minister J.P. Nadda termed the move a "historic step" towards sustainable fertilizer production, reduced carbon emissions, and enhanced energy security.

India currently depends heavily on imported ammonia for producing phosphatic and potassic fertilizers. To address supply volatility and price fluctuations, companies have entered into 10-year agreements for green ammonia at fixed prices, ensuring stable supply and cost predictability.

The initiative, backed by the ₹19,744 crore National Green Hydrogen Mission, aims to reduce import dependence, save foreign exchange, and promote domestic production. It is expected to save about \$2.5 billion over the next decade.

Under the programme, 7.24 lakh tonnes per annum of green ammonia supply have been allocated to fertilizer units, with prices discovered significantly lower than global rates.

The government said the transition will lower the sector's carbon footprint, attract investments, create jobs, and strengthen long-term sustainability in fertilizer production.



NIFTEM-K, CANADA'S UNIVERSITY OF SASKATCHEWAN INK MOU TO BOOST FOOD SCIENCE COLLABORATION

New Delhi: The National Institute of Food Technology Entrepreneurship and Management-Kundli (NIFTEM-K) has signed a Memorandum of Understanding with the University of Saskatchewan, Canada, to enhance cooperation in food science and technology.

The agreement focuses on joint research, academic programs, and skill development in areas such as food processing, food systems economics, and business development. It also includes faculty and student exchange programmes and collaborative training initiatives.

The partnership aligns with the recently

announced India-Canada Centre of Excellence in Pulse Protein, to be jointly led by both institutions.

Officials said the five-year MoU aims to promote innovation, strengthen food processing value chains, and support sustainable food systems through shared expertise and research.



₹793 CRORE APPROVED UNDER PLI SCHEME TO BOOST MILLET PROCESSING; 4,600+ UNITS SUPPORTED

New Delhi: The government has approved ₹793 crore under the Production Linked Incentive (PLI) Scheme for millet-based products to promote processing and value addition, the Ministry of Food Processing Industries said.

The incentives have been sanctioned to 29 companies, including large and small enterprises, out of the ₹800 crore allocation for millet products. The move aims to expand millet usage in domestic and export markets.

Under the PM Formalisation of Micro Food Processing Enterprises (PMFME) scheme, 4,612 micro units have been supported with ₹91.2 crore in subsidies for millet processing. Millets have also been identified under the One District One Product (ODOP) initiative in 21 districts. The government is promoting millet processing through multiple schemes,

including PMKSY and PMFME, along with branding and marketing support for small producers.

Sales of millet-based products have seen a sharp rise—from ₹35 crore in 2020-21 to ₹814 crore in 2024-25—while procurement increased significantly, reflecting growing demand.

The information was shared by Minister of State for Food Processing Industries, Shri Ravneet Singh, in a written reply in the Lok Sabha.

PROCESSED FOOD EXPORTS DECLINE OVER THREE YEARS; GOVT STEPS UP PROMOTION EFFORTS

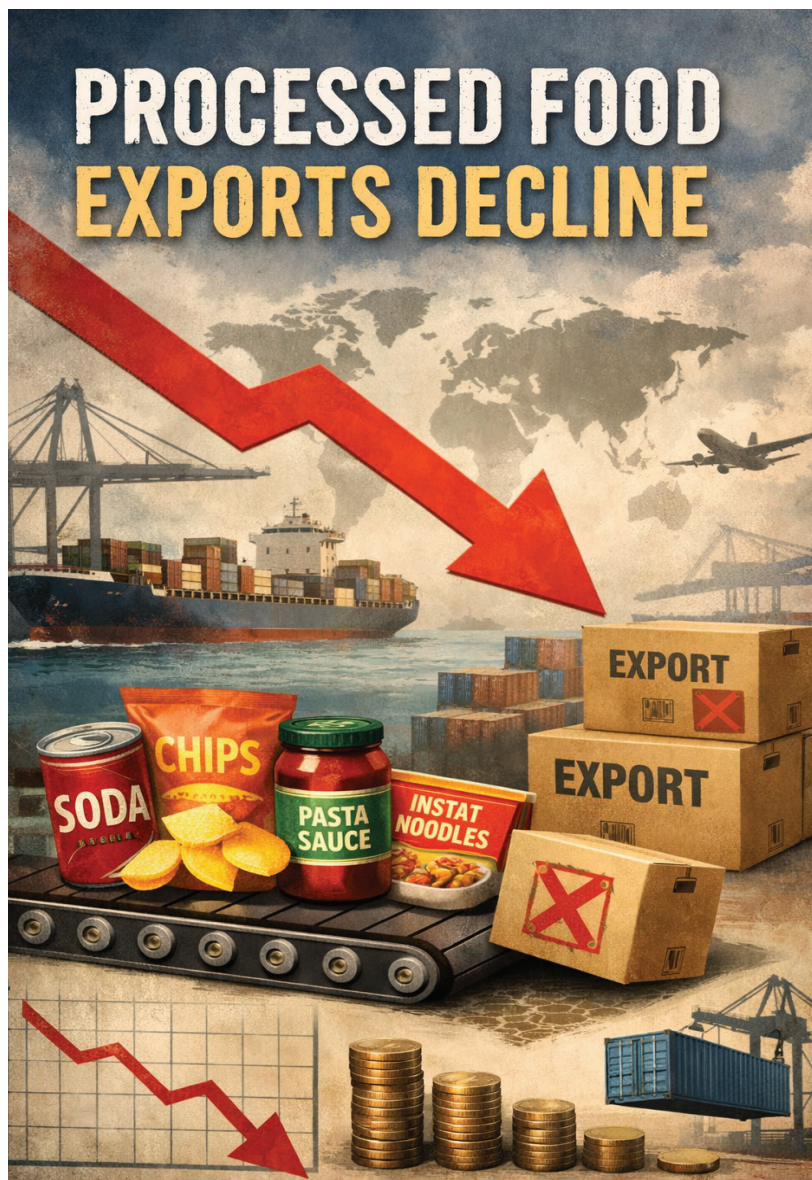
New Delhi: India's processed food exports have witnessed a decline over the past three years, falling from \$13,078 million in 2022-23 to \$10,098 million in 2024-25, according to government data. Key export destinations for Indian processed food products include the USA, UAE, Bangladesh, Libya, Nepal, and Sri Lanka, among others.

To boost exports, the Agricultural and Processed Food Products Export Development Authority (APEDA) is providing financial assistance under its export promotion scheme, focusing on infrastructure, quality improvement, and market development. The agency also facilitates participation in international trade fairs, buyer-seller meets, and reverse buyer-seller meets to expand global market access.

Additionally, APEDA's BHARATI initiative is supporting 100 agri-food and agri-tech startups with mentoring and export facilitation, while capacity-building programmes are being conducted to help MSMEs, women entrepreneurs, and farmer groups meet global standards.

The government is also promoting exports through the 'Districts as Export Hubs' initiative and the newly approved Export Promotion Mission to strengthen competitiveness.

According to the Economic Survey 2025-



26, India has the potential to achieve \$100 billion in combined exports of agriculture, marine, and food products within the next four years.

The information was shared by Minister of State for Food Processing Industries, Shri Ravneet Singh, in a written reply in the Rajya Sabha.



KERALA MARINE FISH PRODUCTION STABLE; ₹1,418 CRORE APPROVED TO BOOST FISHERIES

New Delhi: Marine fish production in Kerala has shown fluctuations over the years but no significant long-term decline, according to a study by ICAR–Central Marine Fisheries Research Institute (CMFRI). Production rose from 4.82 lakh tonnes in 2015 to 6.47 lakh tonnes in 2024-25, indicating overall stability.

To strengthen the sector, the Centre has approved fisheries projects worth ₹1,418 crore for Kerala under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) over the last five years. Key initiatives include artificial reefs, deep-sea fishing vessels, aquaculture expansion, and climate-resilient coastal villages to boost fish stocks and diversify livelihoods. The government is also supporting

infrastructure such as cold chains, fish markets, and transport systems, along with modern technologies like biofloc and recirculatory aquaculture systems. A seasonal fishing ban is enforced annually to conserve marine resources, with financial assistance provided to over 1.7 lakh fishers in Kerala during the period.

To improve market access, digital platforms such as e-trading systems and real-time price information services have been introduced, along with integration into the Open Network for Digital Commerce (ONDC).

The measures aim to ensure sustainable fisheries, improve incomes, and strengthen the marine economy in the state.



EMPOWERING TRIBAL FISH FARMERS OF ASPIRATIONAL DISTRICT OF MEGHALAYA THROUGH CIFRI TECHNOLOGY

Guwahati: ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI) developed a product "CIFRI CAGEGROW", a floating fish feed in order to support scientific fish farming. In order to popularize the feed among tribal fish farmers of Meghalaya, ICAR-CIFRI, Regional Centre Guwahati in collaboration with the Department of Fisheries (DoF), Government of Meghalaya organized a "Field Day-cum-input distribution programme" under TSP programme of the Institute at Meghalaya State Fisheries Research & Training Institute, Mawpun, Meghalaya. The programme will benefit the under privileged fish farmers of Ri-Bhoi district, which is an aspirational district of Meghalaya. The programme was organized under the overall guidance of the Director, ICAR-CIFRI, Barrackpore; the Director of Fisheries, Govt. of Meghalaya; Dr. S. K. Majhi, Head, ICAR-CIFRI RC, Guwahati; Shri Grikjang, S. R. Marak, Principal, MSFR & TI, Mawpun. It was coordinated by Dr. Pronob Das, Dr. S. C. S. Das, Senior Scientists and Mr. A. Kakati, Technical Officer. Mr. Terry Lyngdoh Supervisor, MSFR & TI, Mawpun also present in the programme. The programme was attended by 70 participants including fish farmers, officials, Scientist, and media personnel.

During technical discussion, Dr. P. Das explained about different products and technologies developed by the Institute for benefits of farmers of the mid-altitude region. He also briefed about scientific merits of CIFRI CAGEGROW floating feed. Dr. S. C. S. Das briefly explained about fish farming techniques for fish production enhancement in a sustainable manner. Mr. A. Kakati spoke about fish feed, feeding and health management aspect of aquaculture while Shri Grikjang, and S. R. Marak highlighted different government schemes for fisheries and aquaculture in Meghalaya.

During the interactive Session, Scientists and officials addressed the queries raised by the farmers on different aspect of aquaculture and fisheries. They urged the participants to adopt sustainable fish farming practices for their livelihood. On the occasion, a total of 5000 kg CIFRI CAGEGROW floating feed was distributed among 50 tribal fish farmers' of Meghalaya. Scientist of ICAR-CIFRI requested the farmers to give report on performance of the feed in their ponds. The critical input support in the form of 'CIFRI CAGEGROW' feed is expected to enhance fish production and income of the farmers.

APEDA SHOWCASES TOP INDIAN SPIRITS AT PROWEIN DÜSSELDORF 2026

India: India's premium spirits industry will take center stage at ProWein Düsseldorf, the world's leading trade fair for wines and spirits, as the Agricultural and Processed Food Products Export Development Authority (APEDA) showcased a curated selection of Indian spirits and wines at the India Pavilion from March 15 to 17, 2026.

The India Pavilion, organized by APEDA under the Ministry of Commerce and Industry, Government of India, featured a range of premium Indian single malt whiskies and spirits from leading exporters. The showcase included portfolios from South Seas Distilleries, USL, and other Indian companies, reflecting the growing international recognition of Indian single malt whisky and premium spirits.

Among the spirits on display were expressions from South Seas Distilleries, one of India's oldest distilling houses and the maker's of India's oldest single malts. The company presented key brands including Crazy Cock Indian Single Malt Whisky and Six Brothers Mahura, which represent both contemporary innovation and legacy craftsmanship within India's spirits landscape. Visitors to the APEDA India Pavilion had the opportunity to explore a diverse range of Indian single malt whiskies and premium spirits, engage with brand representatives, and learn about the unique factors shaping Indian single malt whisky production, from climate-driven maturation to modern distillation techniques.

India has rapidly emerged as one of the most dynamic regions in the global single malt whisky landscape. The country's tropical climate creates a unique maturation environment, where casks breathe far more frequently than



they do in colder whisky-producing regions. This intensified interaction between spirit and wood allows whiskies in India to evolve in ways that are markedly different from their counterparts matured in cooler climates, what takes decades elsewhere can unfold within just a few years in India. As the category gains global recognition, producers are increasingly focusing on premiumization while expanding their presence in international export markets.

Held annually in Düsseldorf, ProWein attracts thousands of industry professionals including importers, distributors, retailers, sommeliers, and media from across the world. Participation at the event provides Indian exporters with a strategic platform to strengthen international partnerships and expand export opportunities.

As global consumers increasingly seek diverse and distinctive single malt whisky origins, India's producers are well positioned to play a growing role in shaping the future of the global spirits category.

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